In works of reference, Australia generally is credited with heat in excess of that due to its latitude. It is difficult to say why, unless it arose from a habit of one of our early explorers who carried a thermometer and carefully published all the high, and none of the low readings he got, until, fortunately for the colony, the thermometer was broken and the unfair register stopped. But not only the interior—Sydney even to the present day is credited, in standard works of reference, with a mean temperature of 66·2°, or more than three degrees higher than the true mean, which is 62·9°. Such an error is not excusable when meteorological observations have been taken and published for just forty years. There is another error made by some writers when describing Australia. It is shown by them inverted on the corresponding latitudes in Europe, and the reader naturally infers that Australia is as hot as those parts of Europe. Confining our attention to New South Wales, that is between 29° and 37° of south latitude, we find that generally it is cooler than a corresponding part of Europe. The mean temperature of the southern parts of England is about 52°, and that of France, near Paris, about the same, increasing as you go south to 58·5° at Marseilles. Taking this as a sample of the best part of Europe, let us see how the mean temperatures in the colony compare with those: Kiandra, our coldest township, situated on a mountain, is 46°; Cooma, on the high land, 54°; Queanbeyan, high land, 58°; Goulburn, high land, 56°; Armidale and New England district, 56°; Moss Vale, 56°; Kurrajong, 53°; Orange, 55°. These towns are scattered along the high table-lands from south to north, and represent fairly the climate of a very considerable portion of the whole colony. Next to this in point of temperature is the strip of land between the ocean and the mountains, and which is affected by the cooling sea-breezes. Here we have a mean temperature ranging from 60° at Eden, the most southern port, to 68° at Grafton, one of the northern ports. Sydney, in latitude 34°, has a summer temperature only four degrees warmer than Paris, which is in latitude 49°. Now the usual difference for a degree in latitude is a degree in temperature, and therefore, if Sydney were as much warmer than Paris as its latitude alone would lead us to expect, its temperature should be 74°, and that is 15° warmer than Paris; but as we have seen, it is only 4° warmer. This single example is enough to prove the comparative coolness of our coast districts. The investigation made during recent years shows that the mean temperature of the whole colony, as derived from forty-five stations scattered over it, is 59·5°, three degrees lower than that of Sydney, or only one degree hotter than that of Paris.

It may be mentioned that the highest shade temperature ever recorded in Sydney was 106·9°, and near Paris a temperature of 106·5° has been recorded.

The third great district, consisting of lower land and plains to the west of the mountains, has a climate considerably warmer in summer than the parts above described, owing to the powerful effect of the sun on land having little forest and little or no wind; but in winter the temperature sinks down much lower than the coast districts, owing to the great radiation; so that the annual mean temperature is not so great as the summer heats would lead one to anticipate. A table has been prepared for the purpose of showing by comparison with many places in Europe and America the temperature of the colony. The places have been arranged in order of temperature, taking for that purpose the mean annual temperature. This shows at once that the range of temperature here is equivalent to that offered by Europe from the north of England through France to Sicily. Such a range is more remarkable, because if New South Wales were placed on the map of Europe according to its latitude it would extend from Sicily to Cairo, whereas when placed by its temperature it stretches as we have seen from Sicily northwards to England. Nor is this all that the table shows us. For even when we find a place in Europe with a temperature equal to that of some place here, it is at once observed that the summer temperature in Europe is warmer than the colonial one and the winter colder; for instance, Naples, 60·3°; Eden, 60·3°; summer at Naples, 74·4°; at Eden, 67·9°; winter at Naples, 47·6°; Eden, 51·9; and so generally the southern country has the cooler and more uniform temperature. It is worthy of remark that the only places here of equal mean and summer temperature with places in Europe are those which are to be found on the western plains, as at Wagga Wagga, which has a mean temperature of 60·3°; Naples, 60·3°; and summer temperature of both is 74°; or again, to compare the places of the same or nearly the same latitude, Messina, in Sicily, latitude 38° 11′, has a mean temperature of 66°, summer 72·2°, winter 55°; Eden, New South Wales, in latitude 37°, has a mean temperature of 60·3°, summer 67·9°, winter 51·9°; or Cairo, in latitude 30°, mean of 72°, summer 85·1°, winter 58·2°; Grafton, latitude 29° 45′, mean 68·1°, summer 76·8°, winter 58·4°. It is useless to multiply examples,—we have here enough to show how much cooler Australia really is than the fervid imaginations of some writers have made it appear in print.

Looking at this question of temperature generally, it will be seen that New South Wales is no exception to the general deduction of science that the southern lands are cooler than those of corresponding latitudes in the north, and it is only during hot winds, which are very rare in New South Wales, that the temperature rises to extremes. But to leave Europe, and compare the climate of New South Wales with that of America. Our limits of latitude would place us from Washington to New Orleans. Now the mean temperature at Washington is 55° and at New Orleans 68°, while that of Eden is 60·3° and Grafton 68·1°; so that if mean temperature were a complete test of climate it would appear that our coast is hotter than corresponding latitudes in America. But mean temperature is not enough; we must compare the summer and winter temperatures; and summer at Washington rises to 76·7° and at Eden only to 67·9°, 9° cooler; New Orleans summer is 82° and Grafton 76·8°; but 82° hardly represents the summer heat at New Orleans, for it is a steady broil, during which every day for three months of summer the heat is over 80°, a temperature that is only reached on this coast during hot winds, or in other words, very seldom. But winter temperature at Washington falls to 37·8°, and at New Orleans to 56°; at Eden 51·9°, and at Grafton 58·4°. Hence it is evident that on this coast the heat is very much less in summer and greater in winter than upon the coast of America. Such facts place the colony in a very different position in regard to climate from that which it has occupied in published works, for instead of being a hot country we see that its coast districts are much cooler than corresponding latitudes in Europe and America, and that in its elevated districts, which comprise a large part of it and much of the best land, it has a climate no warmer than the best and most enjoyable parts of Europe in much higher latitudes; but while bringing these facts into due prominence it is not the intention to deny that another considerable part of the colony, forming the western plains, is subject to greater heat, caused, no doubt, by the sun's great power on treeless plains, and the almost total absence of cooling winds; yet, although in summer the temperature here frequently rises over 100°, and sometimes up to 120°, yet, owing to the cold at night and in winter, the mean temperatures are not greater than those of corresponding latitudes in the northern hemisphere; and this part of the colony being remarkably dry, the great heat is by no means so enervating as a temperature of 80° in the moist atmosphere of the coast, and, what is of still more importance, it does not produce those terrible diseases which are usually the offspring of hot countries. This is also, no doubt, due to the dryness of the air. Stock of all kinds thrive remarkably well, and are very free from disease in those hot western districts.

SCIENTIFIC SERIALS.

THE *Quarterly Journal of Microscopical Science* for August 1892 contains:—On the anatomy of *Pentastomum teretiusculum* (Baird), by Prof. W. Baldwin Spencer, M.A. (Plates i. to ix.). Whilst collecting on Kings Island, which lies to the west of Bass Straits, half-way between the mainland of Victoria and Tasmania, numerous specimens of the copper-head snake (*Hoplocephalus superbus*) were found, in the lungs of which a large species of Pentastomum were parasitic; afterwards the same parasite was discovered in the lungs of the black snake (*Pseudechys porphyriacus*) in Victoria; on examination there seemed little doubt but that the species was the one described by Baird long ago (1862) from specimens obtained in the mouth of a dead copper-head snake in the Zoological Gardens, London, under the name of *Pent. teretiusculum*. In this paper we have a very complete account of the anatomy of this form, there being descriptions and figures of its external anatomy, schematic representations of the muscular, alimentary, secretory, nervous, and reproductive systems, and an account of the sense organs. The paper is illustrated by ten double plates.—On the minute structure of the gills of *Palæmonetes varians*, by Edgar J. Allen, B.Sc. (Plate x.). It would seem that so far as the gills of this crustacean are concerned, the statement made by Haeckel and Ray Lankester, that the circulatory system of the Decapods is everywhere closed, does not hold true. It would also seem fairly certain that the masses of cells surrounding the venous channels, in which Kowalevsky found litmus deposited a few hours after its injection, exercise an excretory function. In addition to these excretory cells, a large number of glandular bodies occur in the axis of the gill, and these are of two kinds—clear and reticulate glands.

The number for November 1892 contains:—On the development of the optic nerve of vertebrates, and the choroidal fissure of embryonic life, by Richard Assheton, M.A. (Plates xi. and xii.). That the optic nerve is formed by the differentiation of the cells of the optic stalk into nerve fibres, which consequently lose connection with the inner wall of the optic cup, and piercing the outer wall, make connection with the outer face thereof, is held to be probable by such writers as Balfour, Foster, Marshall, Haddon, and others, whilst the opinion that it is formed by the growth of nerve fibres either from the retina (outer wall of the optic cup) or from the brain, along the optic stalk, but outside it and unconnected with it, is or has been held by His, Müller, Kolliker, Hertwig, Orr, and has been recently supported by Keibel, Froriep, and Cajal. Schäfer seems to be uncertain which view to take. As the result of the author's investigations in the frog and chick, he concludes that the optic stalk takes no part in the formation of the nervous parts of the organ of sight. The optic nerve is developed independently of the optic stalk, and at first entirely outside it. The great majority of the fibres forming the optic nerve arise as outgrowths from nerve cells in the retina.—On the larva of *Asterias vulgaris*, by George W. Field, M.A. (Plates xiii. to xv.).—On the development of the genital organs, ovoid gland, axial and aboral sinuses in *Amphiura squamata;* together with some remarks on Ludwig's hæmal system in this ophiurid, by E. W. MacBride, B.Sc. (Plates xvi. to xviii.). Concludes that echinoderms agree with other cœlomata in the origin of their genital cells these latter have at first an unsymmetrical position in echinoderms, and afterwards take on a radially symmetrical disposition in correspondence with the secondarily acquired radial form of the body. The origin of these cells adjacent to the stone canal suggests a comparison of the origin of the genital cells near the nephridia in many annelids, but the homology of the stone canal with a nephridium has yet to be proved.—On a new genus and species of aquatic Oligochæta belonging to the family Rhinodrilidæ, found in England by W. B. Benham, D.Sc. (Plates xix. and xx.). This new worm receives the name of *Sparganophilus tamesis;* it was found in some numbers in the mud of the Thames, adhering to the roots of *Sparganium ramosum*, near Goring; the cocoon is drawn out to a point at one end, while in the other it shows a narrow frayed end. As the home of the Rhinodrilidæ is America, the author suggests that the cocoons of this worm may have been introduced into the Thames amongst the roots of water plants, or attached to timber from the United States.

American Meteorological Journal, December.—Atmospheric electricity, earth currents, and terrestrial magnetism, by Prof. C. Abbe. The author has collected from various telegraph companies particulars about electrical storms, which illustrate the magnitude of the disturbances that frequently occur. The present electrical and magnetic observatories, which usually observe only some part of the whole series of phenomena, need to be supplemented by completely equipped establishments recording continuously the north-south, the east-west, and the zenithal-antipodal differences of potential. The ordinary records of atmospheric electricity give merely the difference of potential of the earth and a point in the atmosphere defined as the end of the water-dropping collector.—Notes on the use of automatic rain gauges, by J. E. Codman. Observations were made continuously for three years with the object of showing what difference the size of the gauges would make in the amount of rainfall collected. The largest gauge had a diameter of over 22 inches, and the smallest 2 inches. The results show that the size of the gauge made no practical difference. He also gives the results of rainfall collected in gauges erected at various heights on a mast. The result showed that a gauge at an elevation of 50 feet or less above the surface of the ground will collect the same amount as one on the ground, provided both are situated in a position not affected by counter-currents of air. This result agrees with that found by Prof. Hellmann in his experiments at Berlin.—Sunshine recorders, by Prof. C. F. Marvin. Thus far two methods only have been in general use, (1) the focussing of the rays of the sun by means of a glass sphere and obtaining a burn on the surface of a card, and (2) the photographic method, producing a trace on sensitized paper. The first method records only bright sunshine, while the latter method is more sensitive and records fainter sunshine. Prof. Marvin has improved a method first developed by D. T. Maring of the Weather Bureau, consisting in principle of a Leslie differential air thermometer, mercury being used to separate the air in the two bulbs. When properly adjusted and exposed to sunshine the lower blackened bulb becomes heated and causes the column to rise above a platinum point and close an electric circuit. The instrument, of which a drawing is given, is said to respond promptly to sunshine and shadow. The other articles are:—Late investigation of thunderstorms in Wisconsin, by W. L. Moore.—Observations on the aurora of July 16, by T. W. Harris, and Temperature sequences, by Prof. H. A. Hazen.

THE articles in the *Journal of Botany* for November and December are mostly of interest to students of British botany. Mr. F. J. Hanbury adds two more to his new species of *Hieracium*, *H. britannicum* and *H. caniceps*; Mr. Bagnall describes a new species of bramble, *Rubus mercicus* from the Midland counties; and Mr. W. H. Pearson a new British liverwort, *Scapania aspera*. Mr. G. F. Scott Elliot contributes some useful hints on botanical collecting in the tropics.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, December 8, 1892.—"On the Photographic Spectra of some of the Brighter Stars." By J. Norman Lockyer, F.R.S.

The present communication consists of a discussion of 443 photographs of the spectra of 171 stars, which have been obtained at Kensington and Westgate-on-Sea during the last two years.

The chief instrument employed in this work has been a 6-inch refracting telescope in conjunction with—at different times—objective prisms of $7\frac{1}{2}°$ and $45°$ respectively.

By this method the time of exposure is short, and good definition, with large dispersion, is easily secured. The spectra thus obtained will bear enlargement up to thirty times without much sacrifice of definition.

The 30-inch reflector and slit-spectroscope at Westgate-on-Sea have also been used in the inquiry.

My object has not been so much to obtain photographs of the spectra of a large number of stars as to study in detail the spectra of comparatively few.

In the classifications of stars adopted by others from a consideration of the visual observations, only the broader differences in the spectra have been taken into account. Prof. Pickering has more recently employed a provisional classification in connection with the Henry Draper Memorial photographs of stellar spectra, but this chiefly relates to photographs taken with small dispersion. With larger dispersion it becomes necessary to deal with the presence or absence of individual lines.

In the first instance, the various stars of which the spectra have been photographed at Kensington have been arranged in tables, without reference to any of the existing classifications, and taking into account the finer details. The basis on which the main tabular divisions of the spectra are founded is the amount of continuous absorption at the blue end. This distinction was not possible in the case of the eye observations.

The stars included in the first table are characterized by the absence of any remarkable continuous absorption at the blue end, and by the presence in their spectra of broad lines of hydrogen. These have been further classified in four sub-divisions, depending on the presence or absence of other lines.

In the stars of the second table there is a considerable amount of continuous absorption in the ultra-violet, and the spectra beyond K are very difficult to photograph as compared with the stars of the first table. In these stars the thickness of the hydro-